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The Roadmap to an Improved Braille Display Design

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Abstract

Our innovative braille display, focused on affordability and education, fills a notable void in the market of refreshable braille displays, which are typically costly and not designed primarily for educational use. This product stands out as an economical educational aid for people with visual impairments. It features a system where pressing a keyboard alphabet key corresponds to specific braille pins, allowing for the display of letters or characters. Additionally, our design can represent simple geometric shapes, like circles or squares, using the braille pins. When these pins are raised, the user can feel the braille representation of the character or shape. To achieve the ideal balance of cost-efficiency and functionality in our refreshable braille display, we iterated the design through 3D printing. We determined the most effective version by conducting tests in local braille schools. This poster highlights our journey, displaying the evolution from our initial 3D model prototype to the current functional model of our braille display.

Keywords

Refreshable Braille Display, Braille, 3D Modeling, Piezos

Disciplines

Disability and Equity in Education | Education | Educational Methods | Educational Technology | Electrical and Computer Engineering | Hardware Systems

Authors

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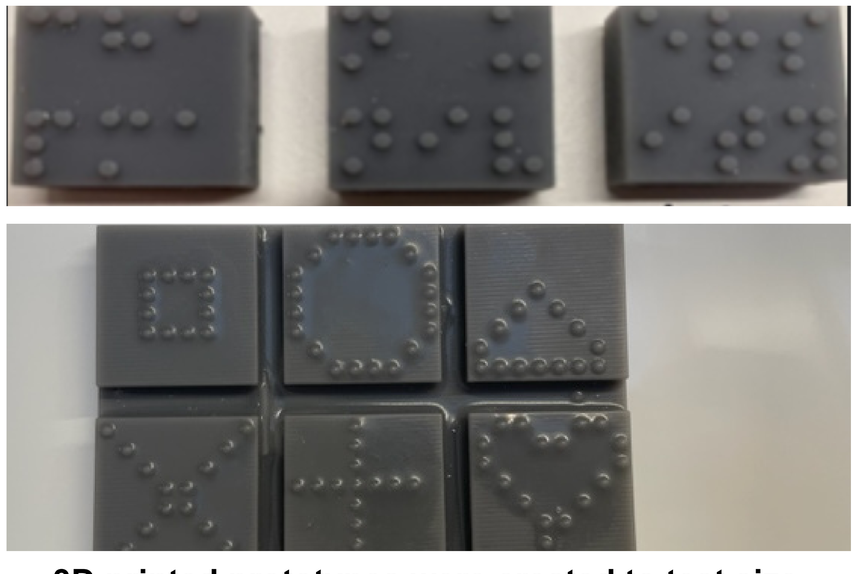
Our Progression:

Step 1: Prototyping



3D printed prototypes were created to test size, spacing, and pin configuration to find the optimum design for our refreshable braille display.

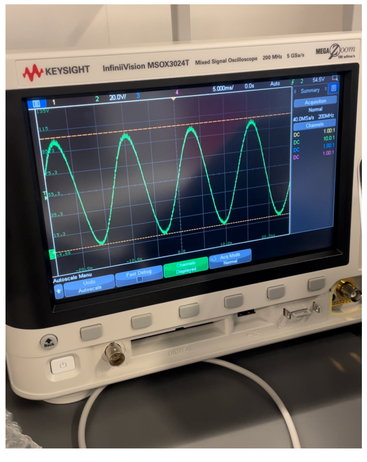
Step 2: Testing the prototypes

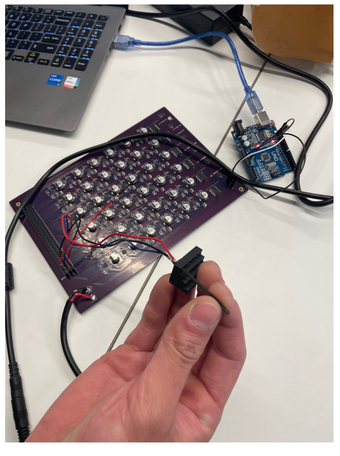
Test subjects: 8 visually impaired adults (6F/2M) who use braille as their primary literacy medium.

Testing was done both qualitatively and quantitatively, recieving verbal feedback and calculating recognition accuracy.

Results supported an 8x8 pin configuration where 64 pins can be used for simple shapes and 36 used to display text.

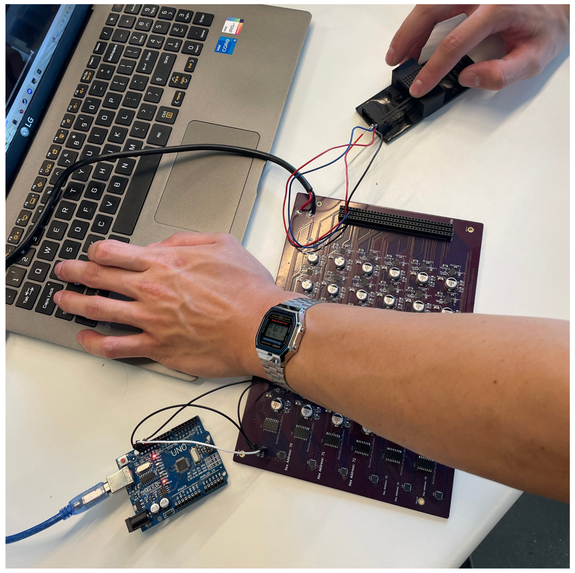
Step 3: Controlling the piezos to move corresponding braille pins





Pictured above is the testing of the output voltage of the PCB board with the piezo. In the photo we can see someone feeling the vibrations and bend of the piezo when voltage is applied.

Step 4: Current working prototype



This image depicts the process where a pressed letter key on a keyboard results in the corresponding movement of a piezo or braille pin, specifically designed to represent the pressed letter.

Key characteristics:
Compact , effectively represents words and simple shapes, and affordable because of the use of less braille cells. Can be used a an educational tool for visually impaired.

References

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